

Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-39 are pending in the application, with claims 1, 11, 22, 33, and 37 being the independent claims. Claims 1, 3, 4, 11, 19, 21, 22, 30, 32, 33, 35, 37, and 39 are sought to be amended. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Rejections under 35 U.S.C. § 112

Claims 1-39 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter.

Although applicants believe that there are technical differences between the claimed subject matter and the applied references, for other reason and to expedite the prosecution, Applicants have amended independent claims 1, 11, 22, 33, and 37, rendering the rejection moot. Reconsideration and allowance of claims 1-39 is respectfully requested.

Rejections under 35 U.S.C. § 103

Eppler in view of Finn:

Claims 1-3, 6, 8-12, 14, 15, 17-20, 22, 23, 25, 27-31, 33, 36, and 37 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,600,714 to Eppler, Jr. *et al.* ("Eppler"), in view of U.S. Patent No. 5,706,344 to Finn ("Finn"). Applicants respectfully traverse and request reconsideration.

Claim 1 recites features that distinguish over the applied references. For example claim 1 recites "*an adaptive filter coupled to the combiner for receiving the single combined reference signal as input, the adaptive filter having filter coefficients adapted to cancel a combination of **an electrical and an acoustical echo** in a near end signal by **modeling in parallel the electrical echo**, caused by imperfect impedance matching of network transmission sections, comprising at least a portion of the primary telephony signal and **the acoustical echo** comprising at least a portion of the secondary audio signal.*"

Therefore, the adaptive filter as recited in claim 1 ***models in parallel*** both the ***electrical echo*** and the ***acoustical echo*** to cancel a combination of an ***electrical*** and an ***acoustical echo*** in a near end signal. In contrast, Eppler discloses using two echo cancellers, a room *acoustic echo* canceller (Eppler, Figure 1, element 24) and a *line hybrid echo* canceller (Eppler, Figure 1, element 46). The line hybrid echo canceller of Eppler is used to cancel the line hybrid echo of the near end signal in the far end signal. The room acoustic canceller of Eppler is used "for the purpose of canceling actual acoustical echoes in the room" (Eppler Col. 7, lines 20-21) in the near end

signal, this is in contrast to the adaptive filter of claim 1 which is used to model in parallel both acoustical and electrical echoes.

The Examiner, on page 5 of the Office Action, contends that "...the Room acoustic echo canceller..." of Eppler "...will function to cancel any acoustic echo...as well as any electrical echo caused by a hybrid". Moreover, the Examiner, in response to the previous amendment, on page 2 and 3 of the Office Action, "...maintains that the only electrical echo that may be produced by hybrid H of Fig 7, is parasitic electrical echo between components on the circuit board" and therefore, "...the canceller of Eppler and Finn would also function to remove any parasitic hybrid electrical echo...". Applicants respectfully disagree.

In the instant application, the digital far-end signal is upsampled and is converted to an analog signal using a digital to analog converter. The analog far-end signal is then transmitted to the near end (instant Specification, Page 18, Lines 18-23). Therefore, the far-end signal will have both an acoustic echo generated in the near-end and an electrical echo generated at the 2 wire-4 wire hybrid at the network interface to the near-end. An acoustic echo is generated in the near-end when the speaker in the near-end receive channel is acoustically coupled to the microphone in the near-end transmit channel, repeating the far-end signal into the near-end transmit channel.

An electrical echo is generated at the 2 wire-4 wire hybrid at the network interface to the near-end by reflection of the far-end signal due to an impedance mismatch at the 2 wire-4 wire hybrid between the 2 wire telephone line and the 4 wire network line. Therefore, Applicants respectfully disagree with the Examiner's

assertion that the electrical echo that may be produced by Hybrid H of Fig. 7 of the instant application is only parasitic electrical echo between components on the circuit board.

Finn is used by the Examiner to allegedly teach, which Applicants do not acquiesce, that a far end signal and a secondary audio signal may be combined. Finn is not used to teach or suggest, nor does Finn teach or suggest, the above-noted features of claims 1.

Finn discloses an acoustic echo cancellation in a single-channel integrated audio and intercom system. The acoustic echo canceller of Finn is also directed only to canceling acoustic echo. The acoustic canceller of Finn is preferably an adaptive finite impulse response filter having sufficient tap length to **model the acoustic path**. This acoustic echo canceller adaptively models the path between the input to a near end loudspeaker and the output from a near end microphone (Finn Col. 3, Lines 41-48). This is in contrast to the adaptive filter of claim 1 which is used to model in parallel both acoustical and electrical echoes.

The Examiner has rejected independent claims 11, 22, 33, and 37 using the identical arguments used in rejecting independent claim 1. Arguments made by the Applicants for claim 1 apply equally to independent claims 11, 22, 33, and 37. For at least these reasons, independent claims 11, 22, 33, and 37 are also patentable over the cited references. Reconsideration and allowance of independent claims 1, 11, 22, 33, and 37 is respectfully requested.

Claims 2-3, 6, and 8-10 are dependent on independent claim 1. Claims 12, 14, 15, and 17-20 are dependent on independent claim 11. Claims 23, 25, and 27-31 are

dependent on independent claim 22. Claim 36 is dependent on independent claim 33. Arguments for these independent claims have been made in the preceding paragraphs. For at least these reasons, dependent claims 2-3, 6, 8-10, 12, 14, 15, 17-20, 23, 25, 27-31, and 36 are also patentable over the cited references. Reconsideration and allowance of these dependent claims is respectfully requested.

Claims 13 and 24 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Eppler in view of Finn as applied to claims 11, 12, 22, and 23. Applicants respectfully traverse and request reconsideration.

Claims 13 and 24 are dependent on independent claims 11 and 22, respectively. Arguments for these independent claims have been made in the preceding paragraphs. For at least these reasons, dependent claims 13 and 24 are also patentable over the cited references. Reconsideration and allowance of these dependent claims is respectfully requested.

Eppler in view of Finn and further in view of Sih

Claims 4, 21, 32, 35, and 39 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Eppler in view of Finn, and further in view of U.S. Patent No. 5,732,134 to Sih ("Sih"). Applicants respectfully traverse and request reconsideration.

Sih is used by the Examiner to allegedly teach, which Applicants do not acquiesce, an echo canceller comprising a double talk logic. Sih is not used to teach or suggest, nor does Sih teach or suggest, the above-noted features of claims 1, 11, 22, 33, and 37. Thus, for at least reasons given above, dependent claims 4, 21, 32, 35,

and 39 are also patentable over the cited references. Reconsideration and allowance of claims 4, 21, 32, 35, and 39 is respectfully requested.

Also, Applicants assert the dependent claims are patentable over the applied references in view of their additional combinations of features.

For example, claims 4, 21, 32, 35, and 39 recites additional features that distinguish over the applied references. In claim 4, as amended, the feature of double talk logic to detect speech in the near end signal in presence of the secondary audio signal is not explicitly or implicitly taught or suggested by the applied references.

The combination as taught by claim 4 can effectively detect between near-end speech, the secondary audio signal and the echoed far-end signal in the near-end signal. This can control the filter adaptation such that only when near-end speech is active, the adaptation of the adaptive filter is disabled. Therefore, presence of secondary audio signal, if near-end speech is not active, will not disable the filter adaptation. This feature of claim 4 is not taught or suggested by the combination of Eppler, Finn, and Sih.

Eppler in view of Finn and further in view of Sellenslagh

Claim 5 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Eppler in view of Finn, and further in view of U.S. Patent No. 3,433,898 to Sellenslagh *et al* ("Sellenslagh"). Applicants respectfully traverse and request reconsideration.

With respect to dependent claim 5, the Examiner contends that Eppler and Finn disclose an echo cancellation system for primary reflection and secondary audio

signals. The Examiner contends that Eppler and Finn fail to disclose cancellation of a secondary audio signal, where the "...secondary audio signal comprises a pulse metering tone." The Examiner contends that Sellenslagh *does* disclose pulse metering tone cancellation in reliance on Eppler and Finn. Applicants respectfully disagree that such a combination is permissible. However, more importantly, Sellenslagh does not cure the shortcomings to the Eppler and Finn references with respect to their use as a basis for rejecting claim 1. Thus, for at least the reasons given above for claim 1, dependent claim 5 is patentable over the cited references. Reconsideration and allowance of claim 5 is respectfully requested.

Eppler in view of Finn and further in view of Hasegawa

Claims 7, 16, 26, 34, and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Eppler in view of Finn, and further in view of U.S. Patent No. 5,905,717 to Hasegawa ("Hasegawa"). Applicants respectfully traverse and request reconsideration.

With respect to dependent claims 7, 16, 26, 34, and 38, the Examiner contends that Eppler and Finn disclose an echo cancellation system for primary reflection and secondary audio signals. The Examiner, on page 10 of the Office Action, contends that Eppler and Finn fail to disclose "...a decimator that downsamples the secondary audio signal to match a sample rate of the primary telephony signal." The Examiner contends that Hasegawa *does* disclose decimation of the audio signal in column 1, lines 15-27.

Applicants respectfully disagree. Hasegawa does not decimate, Hasegawa unpacks received packet data to prepare the data for filtering. Hasegawa does not interpolate, Hasegawa packs data to prepare the data for packet transmission.

Decimation and interpolation require significantly more processing than simply unpacking and packing. Decimation presents aliasing concerns, unpacking does not. Interpolation requires properly constructed finite impulse response filters (FIRs) and attention to the requisite processing, packing does not. Decimation and interpolation are distinctly different and more complex functions than unpacking and packing.

Hasegawa decimation (resampling) requires buffering and reclocking high-rate packet data signals, reducing the data rate to the point where an adaptive FIR filter can function. Hasegawa decimation is described explicitly in column 1, lines 15-27. In FIG. 1, element [1], Hasegawa buffers and decimates, or unpacks, the packet data prior to adaptive filtering, element [3]. In FIG. 1, element [5], Hasegawa buffers and interpolates, or repacks, the packet data prior to transmission. Signal models for unpacking (decimation) and repacking (interpolation) are given by Hasegawa in FIGs. 5A,B and 7A,B, respectively.

Hasegawa resampling is different than that of the Applicants. In claim 7, the Applicants echo cancellation "...downsamples the secondary audio signal to match a sample rate of the primary telephony signal...", or voice signal, the secondary audio signal comprising near end audio and pulse metering tones, as given in Applicants FIG. 7, elements [304] and [340]. Buffering data is not necessary in claim 7; voice data, unlike packet data, is not transmitted and received in high-rate data bursts. For

at least these reasons and those given above for claim 1, dependent claims 7, 16, 26, 34, and 38 are patentable over the cited references. Reconsideration and allowance of claims 7, 16, 26, 34, and 38 is respectfully requested.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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